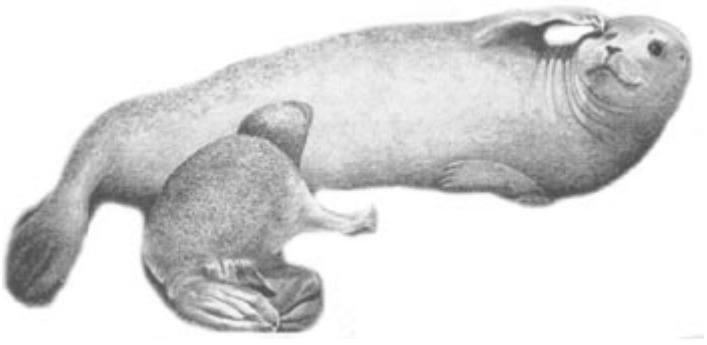
Marine Mammal Classification

Class Mammalia: Mammals

- Order Carnivora: Carnivores
  - Family Ursidae: Polar Bears
  - Family Mustelidea: Sea Otters
  - Family Otariidae: Eared Seals
  - Family Phocidae: Earless Seals
  - Family Odobenidae: Walruses

  (Eared Seals, Earless Seals, and Walruses → General grouping: Pinniped)
- Order Cetacea: Whales, Dolphins, Porpoises
  - Family Odontoceti: Toothed Whales
  - Family Mysticeti: Baleen Whales
- Order Sirenia: Dugongs, Manatees



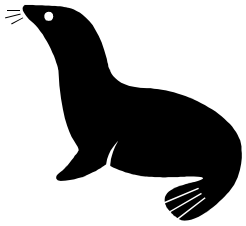
POINT REYES PINNIPEDS

True Seals
(Phocidae)

- No ear flap
- Pull themselves on sand and undulate
- In water: hind flipper propels and front flippers steer

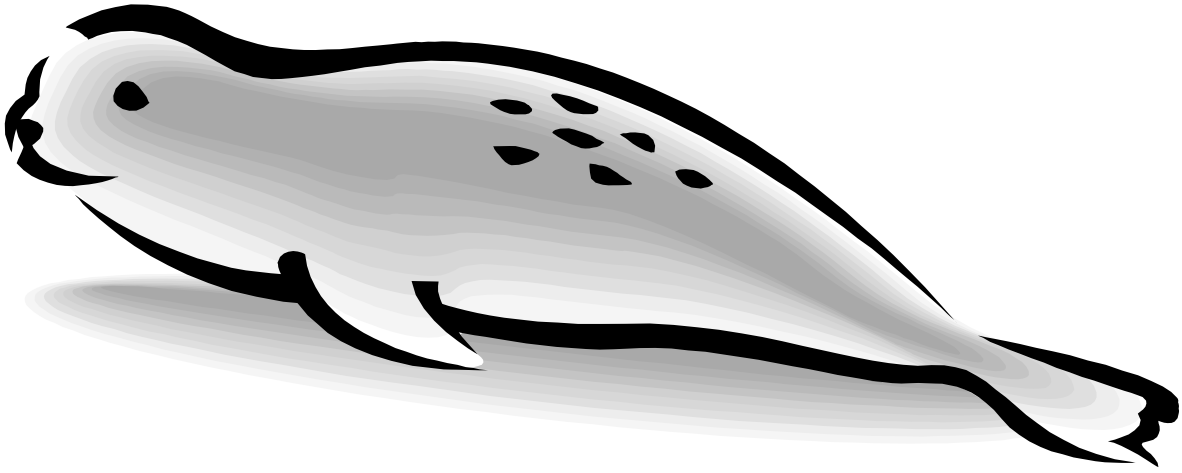
1. Harbor Seal (*Phoca vitulina*)
2. Northern Elephant Seal (*Mirounga angustirostris*)

Eared Seals
(Otariidae)



- Visible ear flap
- "Walk" on all fours
- In water: front flippers propel and hind flipper steers

1. California Sea Lion (*Zalophus californianus*)
2. Northern Fur Seal (*Callorhinus ursinus*)
3. Steller Sea Lion (*Eumetopias jubatus*)
4. Guadalupe Fur Seal (*Arctocephalus townsendi*)

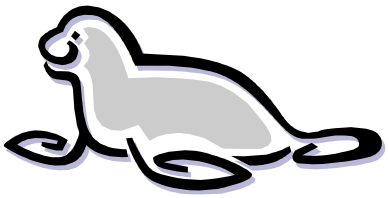


SEAL SCIENTIFIC NAMES

EARED SEALS (OTARIIDAE)

SEA LIONS

Australian *Neophoca cinerea*
*California *Zalophus californianus**
Hooker's *Phocarctos hookeri*
South American (Southern) *Otaria flavescens*
*Steller *Eumetopias jubatus**



FUR SEALS

Austrailian *Arctocephalus pusillus doriferus*
Galapagos *Arctocephalus galapagoensis*
*Guadalupe *Arctocephalus townsendi**
Juan Fernandez *Arctocephalus philippii*
Kerguelen (Antarctic) *Arctocephalus gazelle*
Subantarctic *Arctocephalus forsteri*
*Northern (Alaskan, San Miguel Island, Southern Farallon Island) *Callorhinus ursinus**
South African (Cape) *Arctocephalus pusillus pusillus*
South American *Arctocephalus australis*

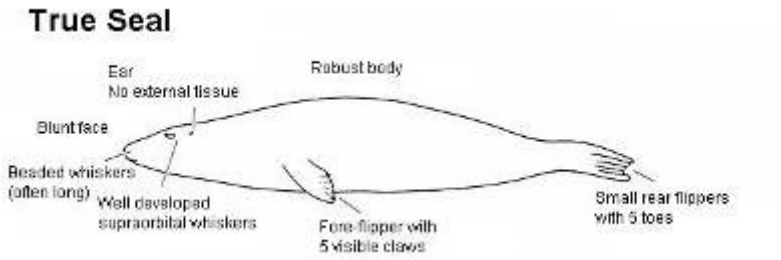
TRUE SEALS (PHOCIDAE)

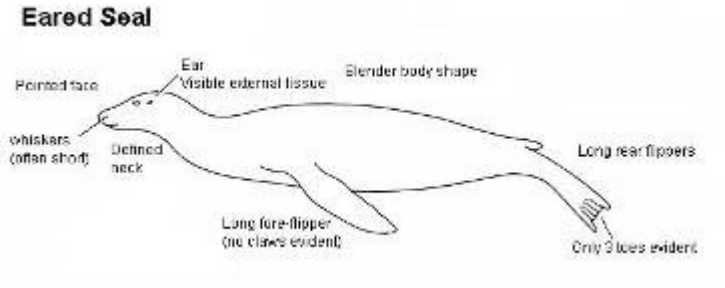
Baikal *Phoca sibirica*
Bearded *Ergnathus barbatus*
Caspian *Phoca caspica*
*Common (Harbor, Spotted) *Phoca vitulina**
Crabeater *Lobodon carcinophagus*
*Elephant (Northern) *Mirounga angustirostris**
Elephant (Southern) *Mirounga leonine*
Gray (Grey) *Halichoerus grypus*
Harp *Pagophilus groenlandicus*
Hooded *Cystophora cristata*
Largha *Phoca largha*
Leopard *Hydrurga leptonyx*
Monk (Caribbean, extinct) *Monachus tropicalis*
Monk (Hawaiian) *Monachus schauinslandi*
Monk (Mediterranean) *Monachus monachus*
Ribbon *Phoca fasciata*
Ringed *Phoca hispida*
Ross *Ommatophoca rossi*
Weddell *Leptonychotes weddelli*

* Found in California

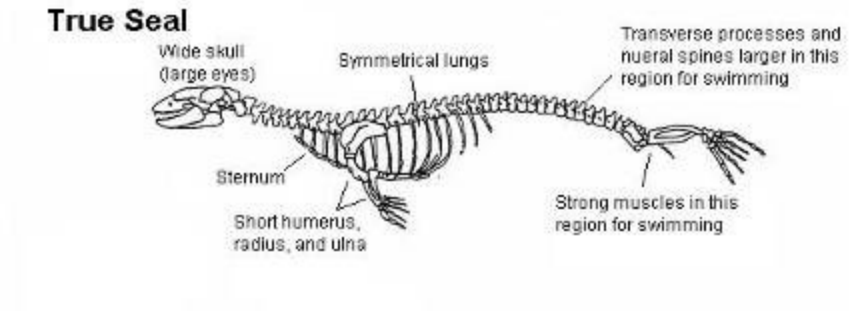
Seal Anatomy:

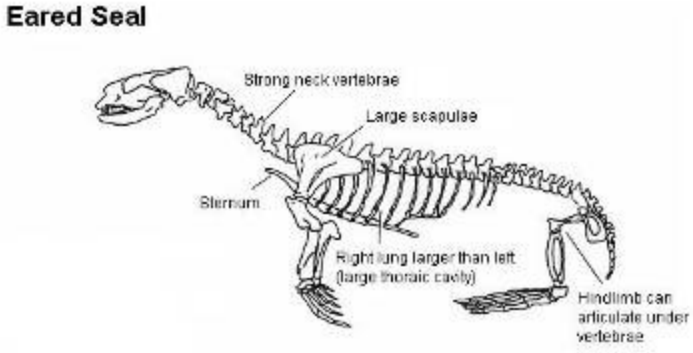
Outer Body Form





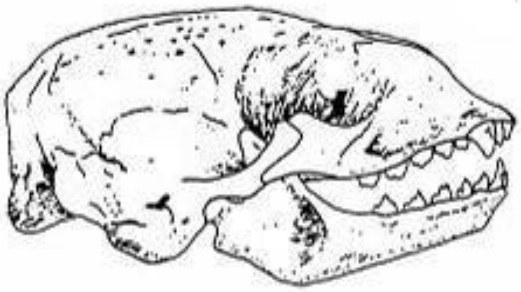
Skeletal Form



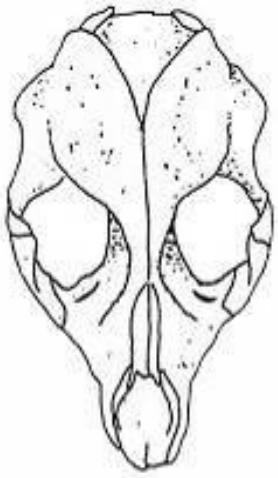


Harbor Seal Skull

Phoca vitulina

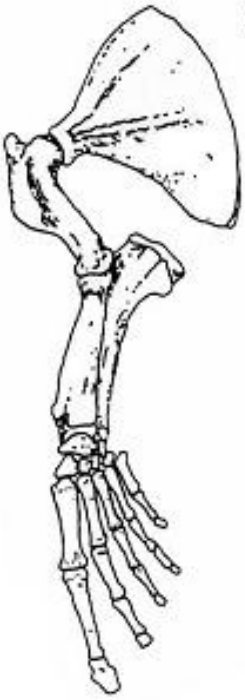


Side View



Dorsal View

Left Pectoral Limbs (Foreflipper)



Otariidae

California Sea Lion

Zalophus californianus

Phocidae

Harbor Seal

Phoca vitulina

A Guide to California Pinnipeds

-Ear pinnae present
-beige and brown whiskers
-short fur

-fore flippers mostly hairless
-fur extends down onto flipper
-nails rudimentary

-hind flippers hairless
-nails present on middle 3 digits
-nails located 1/4 of the length of the flipper from the trailing edge
-able to bring hind flippers under the body

CA Sea Lion

-long ear pinnae present
-beige and brown whiskers
-long fur

-fore flippers hairless
-fur line stops at the top of the flipper, cutting straight accross
-nails rudimentary

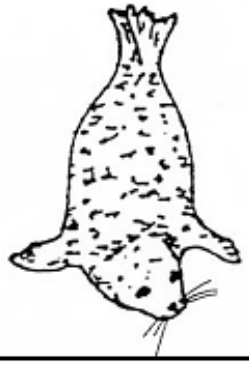
-hind flippers hairless
-nails present on middle 3 digits
-nails located 1/3 of the length of the flipper from the trailing edge
-able to bring hind flippers under the body

Northern Fur Seal

-no pinnae; ear hole visible
-white whiskers

-fore flippers haired
-nails present

-hind flippers haired
-nails present
-hind flippers always behind body



Harbor Seal

-no pinnae; ear hole not visible
-black whiskers

-fore flippers haired
-nails present
-first digit elongated

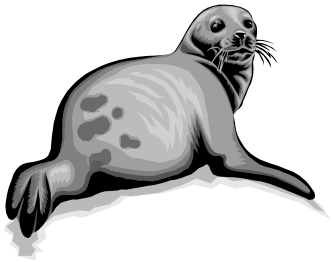
-hind flippers haired
-nails absent
-hind flippers always behind body

No. Elephant Seal

Harbor Seals

COMMON NAMES:

Harbor Seal
Common Seal
Spotted Seal
Hair Seal



Special Note:
The name Pinniped means fin or feather-footed, referring to their modified limbs which have adapted for swimming.

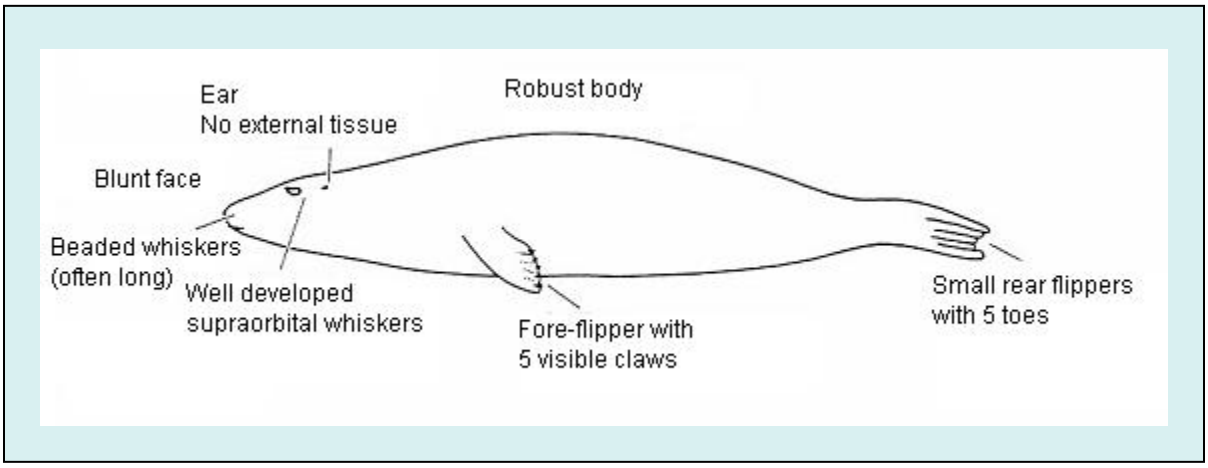
SCIENTIFIC NAMES:

Kingdom: Animalia
Phylum: Chordata
Class: Mammalia
Order: Carnivora
Family: Phocidae
Genus: Phoca
Species: vitulina
Subspecies: richardsi

OTHER HARBOR SEALS?

There are five subspecies of harbor seals that occur in the northern hemisphere. The distinguishable differences are mostly geographic, but some claim to see morphological differences as well. The Point Reyes subspecies is the same throughout the Bay Area and is called the Pacific Harbor Seal (*Phoca vitulina richardsi*), and ranges from Baja to Alaska.

WHAT DO THEY LOOK LIKE?



Size:

Adults weigh 150-300 lbs and are 4-6 ft long. Pups weigh 10-25 lbs and are 24-36 in.

Color:

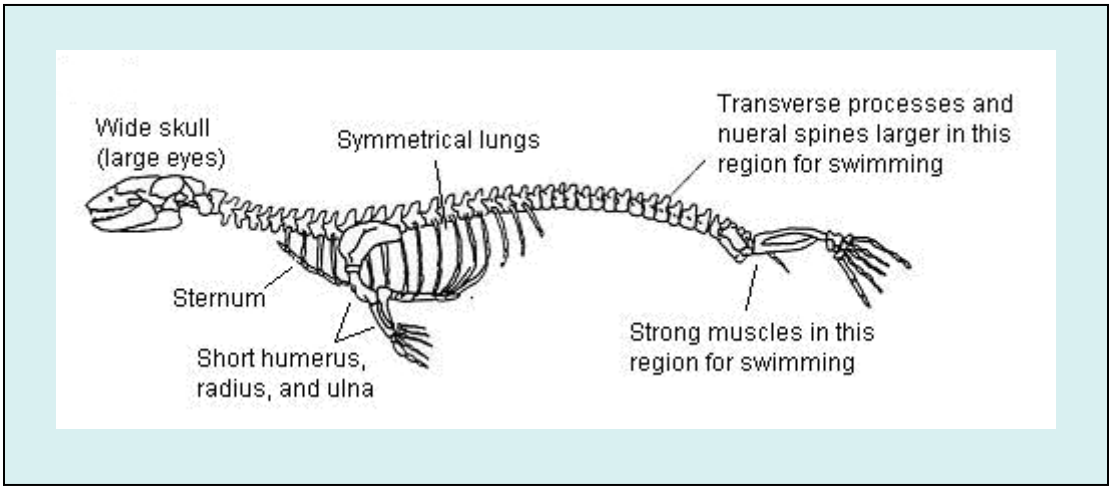
The pelage (coat) of harbor seals has variable color ranging from nearly white or silver to brown or black. They are spotted animals and some individuals have light spots on dark, while others have dark spots on light.

Some seals have red heads and this is caused by iron oxide deposits on the hair shaft.

Gender Differences:

Sexual dimorphism is the term used to describe the physical differences between males and females besides genitalia. An example is the nose and chest shield of the northern elephant seal male. Harbor seals do not display sexual dimorphism.

Skeletal Body:



ISN'T THE OCEAN COLD?

Seals have adapted to living in the cold, marine environment. Here are some of the ways that they have adapted.

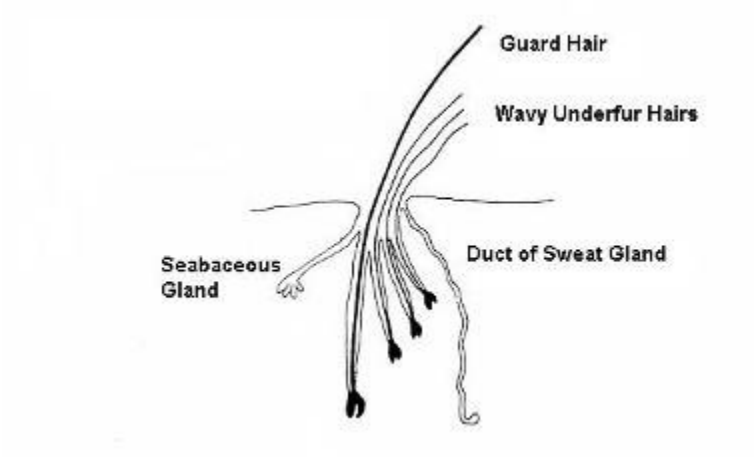
1. Blubber

   Harbor seals and elephant seals have a thick layer of fat under their skin that insulates them. It also stores food energy and increases their buoyancy (helps them use less energy swimming).

2. Pelage

   Their thick fur has 2 layers: guard hairs and underhairs. In fur seals, underhairs insulate the seal, but harbor seals do not rely on fur for insulation. Their oily secretions by each hair help waterproof them. Each year the seals molt their fur and grow a new coat.

Diagram of Hair Bundle of Northern Fur Seal



3. Circulation

   Their circulatory system uses an adaptation called counter-current circulation. This is when the heart pumps warm blood down arteries to vital areas and the veins that carry the blood back to the heart are wrapped around the arteries and are warmed by the arterial blood.

   They also carry 1 ½ times the amount of blood of a human, which helps them stay fully oxygenated when diving. The veins that circulate this blood are constantly contracting and dilating to assist in thermoregulation.

   The rear flippers are also important for thermoregulation and allow seals to lose heat if too hot, instead of sweating.

4. Flippers

   Harbor seals have 4 limbs that all have webbed digits, which allows for swift, efficient movement in the ocean. The forelimbs are used for gripping, scratching, and preening, while the hindlimbs are used for propulsion.

5. Eye Wash

   Seals constantly are emitting protective fluid over their eyes in the water and on land.

6. Ear Closure

Their ear opening pinches closed while they dive under water.

WHERE DO THEY LIVE?

Harbor seals are near shore animals and they will spend their entire year close to it. They prefer estuaries, rivers, sandbars, and areas where sand and rocks are exposed at low tide for hauling out. They usually stay within a couple of miles of shore.

Haul-Outs:

Haul-outs are places where the seals temporarily haul themselves on land for various reasons.

Daily hauling-out occurs year-round and in aggregations. These aggregates may be mixed or of a certain group such as males, juveniles, or pups, which is generally dictated by the season. They haul out more during low tides because of site availability, but some haul out sites are high tide ones that are only accessible at high tide.

During the pupping season females will generally stay near their haul-out with their pups. During the molting season the metabolism of the seals decreases an average of 18.6%. Because of this the seals may haul out anywhere between 12-24 hours a day during this season. Sunlight also increases the hair follicle growth.

Duration of Haul-Outs:

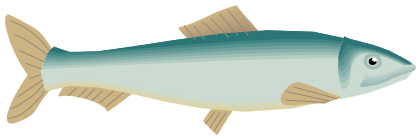
Season	**Hrs/day**
Non-breeding Season	7
Breeding Season	10-12
Molt	11-12

Special Note:
In Point Reyes, harbor seal haul-out behavior has diurnal (daily) and seasonal variation. They haul out during the day and spend the nights feeding. Some seals, though, will haul out at night, too.

Moving Around:

Harbor seals move in search of food and have no definite migration patterns like elephant seals or sea lions. They do concentrate in some areas to breed and move to other areas to feed during the fall and winter. They have been documented to range as far as 500 km from Point Reyes.

WHAT'S FOR DINNER?



What Seals Eat:

Harbor seals are carnivores and they eat mainly schooling fish, cephalopods, and some crustaceans. Some main species in their diet include: herring, anchovies, hake, flounder, sole, and sculpin.

How Much do Seals Eat?

Seals swallow their fish whole. If they happen to capture a fish that is too big to be consumed they may try to thrash it into pieces. A seal can eat between 5-20 lbs per day of fish, depending on food availability and the size and age of the animal.

LIFE CYCLE

Annual Activities of Harbor Seals at Point Reyes National Seashore

	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*
Birthing and Nursing			■	■	■	■						
Weaning				■	■	■	■					
Dispersal								■	■	■		
Mating (high testosterone levels)		■	■	■	■	■	■	■				
Implantation of Embryo								■	■	■		
Molting						■	■	■				

Birth:

Females give birth to one pup per year (twins are extremely rare in marine mammals) between March and June after a 9-10 month gestation period. Pupping occurs later the further north you travel, and earlier south of Point Reyes. Pups are able to swim at birth.

Special Note:
The pup is ejected so fast from the mother that it severs the umbilical chord.

Pups become plump quickly with rich milk from their mother. They nurse for 4-6 weeks. The pup and its mother are very close and she knows her pup by sight, smell, and a unique call amidst the hundreds of other pairs. The female feeds while nursing and the pup accompanies her on foraging trips.

Weaning:

After the nursing period a pup is twice the weight it was at birth, weighing around 50 lbs. The weaned pup, still small, forages close to shore, but will also travel long distances from Point Reyes to Monterey Bay or North to Jenner.

Mating:

Mating starts about 30 days after pups are born and weaned when the female comes in to estrus. Sexual maturity in females and males is reached in about 3-5 years. The male approaches a cow during the mating season frequently with vocal and physical gestures. The couples spend some time playing, rolling, and neck biting in the water and copulate there as well. Because they copulate in water, the act is rarely observed. Recent research has revealed that males hold underwater territories call maritories.

Implantation:

Harbor seals use a reproductive technique called delayed implantation. When the seals copulate, the egg is fertilized by the sperm, but it is not implanted into the side of the uterus immediately. Instead, the implantation is delayed in a blastula (ball) state for 1-1 ½ months. This ensures that the pups are born synchronously every year during the pupping season when they have the best chance for survival.

Mortality:

In the past humans played a much larger role than they currently do in harbor seal mortality. Before the Marine Mammal Protection Act (MMPA), seals were hunted because they compete with fisheries, such as salmon.

Special Note:
A wild harbor seal lives about 25-30 years.

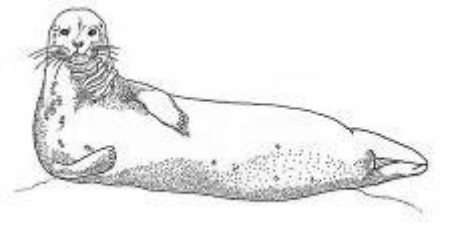
In the natural world they have two main predators: Orcas and sharks. Pups are especially vulnerable to sharks, abandonment and starvation. Harbor seals are also subject to parasites just like land mammals such as nematodes and trematodes that attack their internal organs.

BEHAVIOR

Postures:

Bottling is when the seal is vertical in the water with its nose poking out. They can sleep or rest at the surface and breathe.

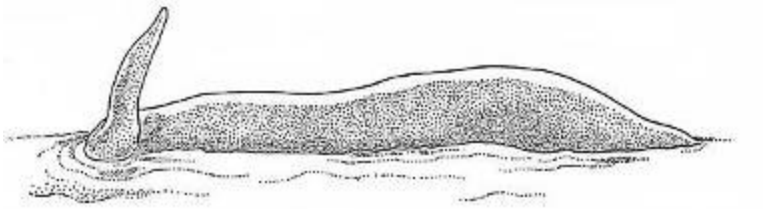
Laying on their side is how they spend most of their time on land.



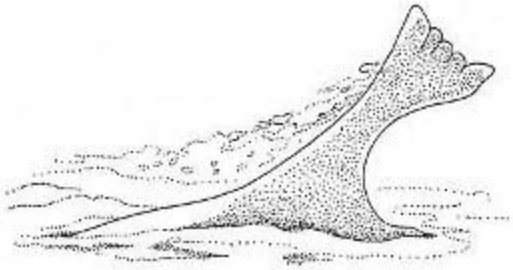
Actions:

Foreflipper wave is done by seals on land when another seal is approaching too closely.

Foreflipper slaps are performed in the water by seals warning each other of danger or communicating aggression towards another seal. This is also used by males during mating season.



Hindflipper slaps are performed in the same way as a foreflipper slap.



Head thrusts or butts are an act of aggression towards another seal. This is usually performed with growling and an open mouth.

Disturbances:

When harbor seals perceive a threat while hauled out, they may react in several ways to this disturbance. These specific reactions are noted as disturbance events by monitors, and identifying a disturbance is described in detail in the Harbor Seal Protocol section of this training manual. It is important to note that although seals will occasionally raise their heads while on land, move around, and leave the haul out, a disturbance behavior is a direct reaction to an event, and will usually be observed as several seals reacting synchronously.

Head-alert is when the seals will raise their head on land to search for possible danger. Their eyes are open, and they are not scratching themselves.

Flushing is when the seals move toward the water, but do not completely enter the water.

Flushing to water is when the seals in one continuous movement approach the water and within 10 seconds are completely wet by the water.

Keep your eyes out for disturbances while surveying

Summary Data

Approximate Pupping Seasons of Seals and Sea Lions at Point Reyes National Seashore

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
True Seals (Phocidae) These species breed at Point Reyes and elsewhere.												
Northern Elephant Seal	■	■	■	■								■
Pacific Harbor Seal			■	■	■	■						
Eared Seals (Otariidae) These species have been seen at Point Reyes, but they breed elsewhere.												
California Sea Lions					■	■	■					
Stellar Sea Lions					■	■	■					
Northern Fur Seals							■	■				

Approximate Size of Seals and Sea Lions at Point Reyes National Seashore

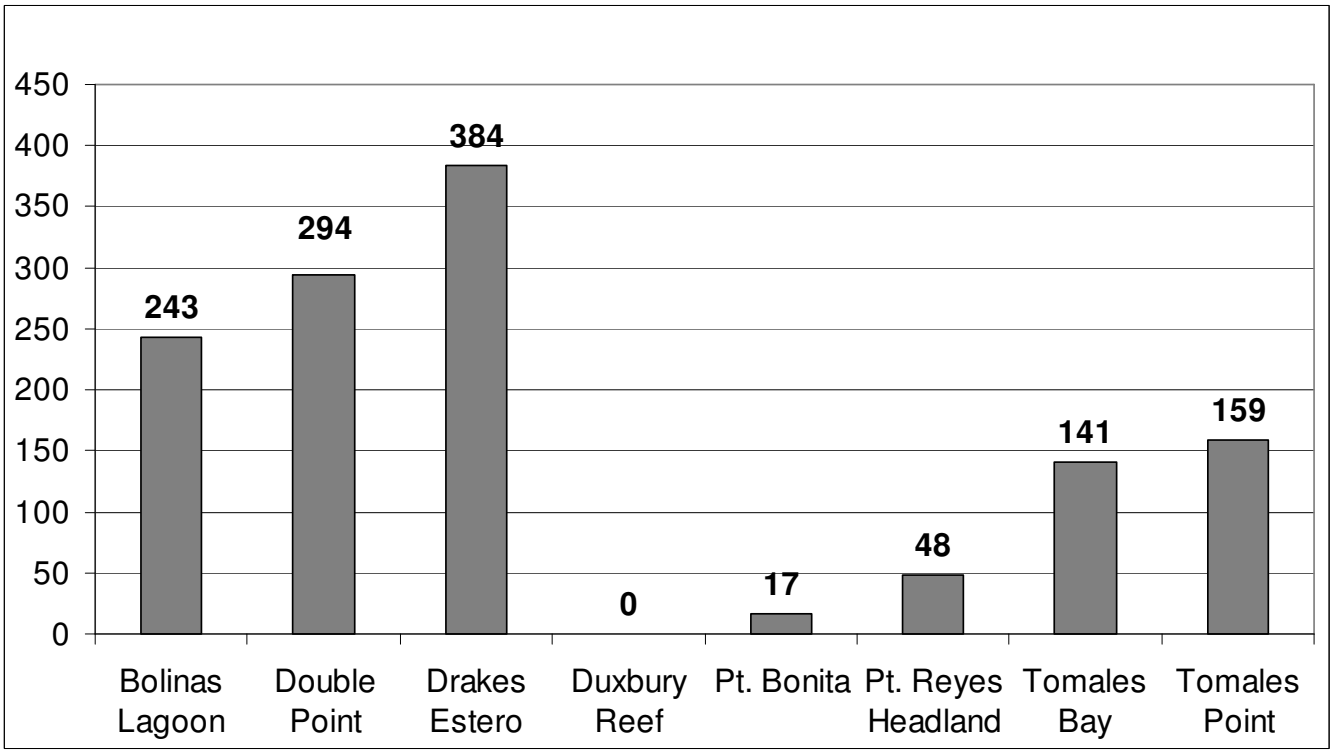
	Male		Female		Pup at Birth	
	Length (ft)	Weight (lbs)	Length (ft)	Weight (lbs)	Length (ft)	Weight (lbs)
True Seals (Phocidae)						
Northern Elephant Seal	**13-18**	**4,000-5,000**	**8-10**	**1,200-1,300**	**4**	**75-80**
Pacific Harbor Seal	**5.6-6.3**	**150-300**	**4-6**	**150-300**	**2-3**	**25**
Eared Seals (Otariidae)						
California Sea Lion	**7-8**	**500-900**	**5-6**	**200-350**	**2-3**	**13-20**
Steller Sea Lion	**8-11**	**1,500-2,500**	**7.5-9.5**	**600-800**	**3**	**35-50**
Northern Fur Seal	**6-7**	**400-600**	**4-5**	**60-130**	**2**	**9-12**

Population Estimates of Seals and Sea Lions At Point Reyes National Seashore

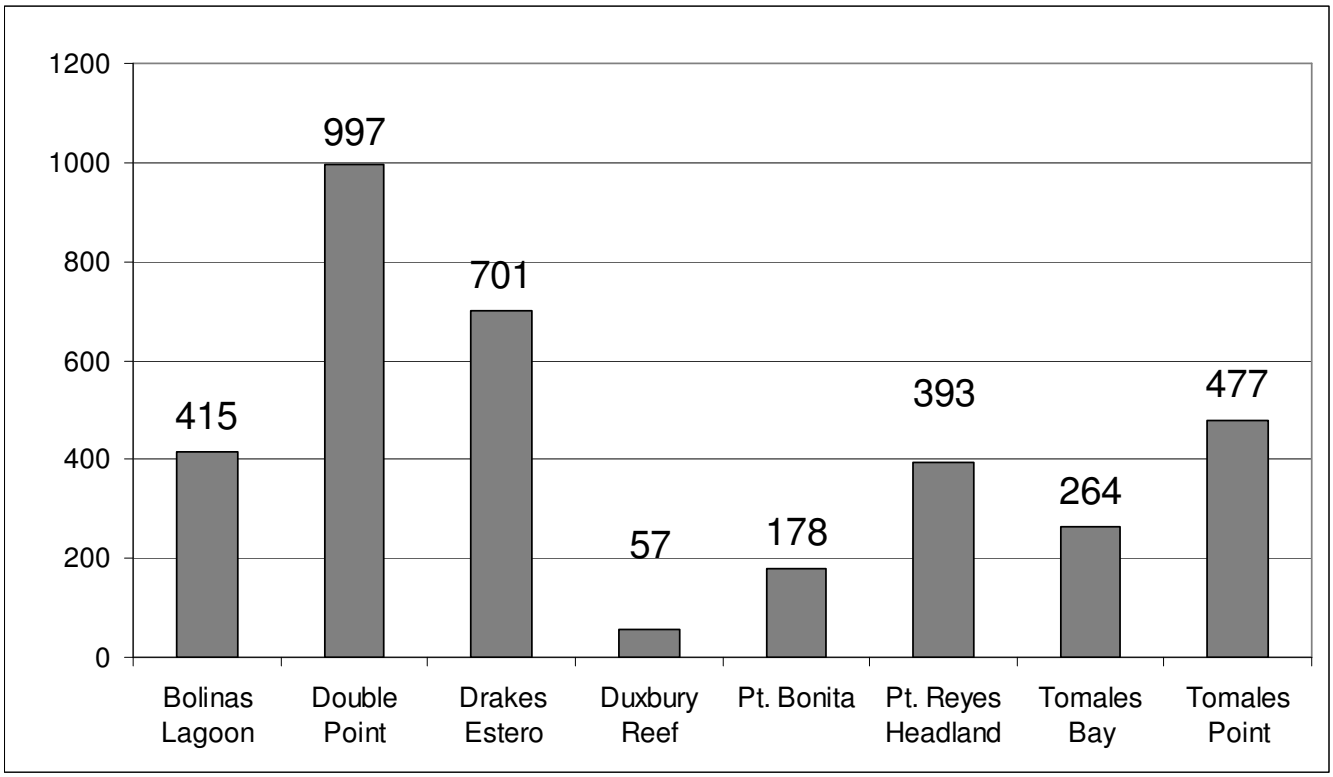
	On Shore at Point Reyes (varies seasonally)	California (varies seasonally)
True Seals (Phocidae)		
Northern Elephant Seal	**2,000**	**124,000**
Pacific Harbor Seal	**6,000**	**31,000**
Eared Seals (Otariidae)		
California Sea Lions	**700**	**238,000**
Steller Sea Lions	**20**	**9,000 (Oregon/California)**
Northern Fur Seals	**0**	**300 (Farallones)**

Summary of 2012 Harbor Seal Data (not for distribution)

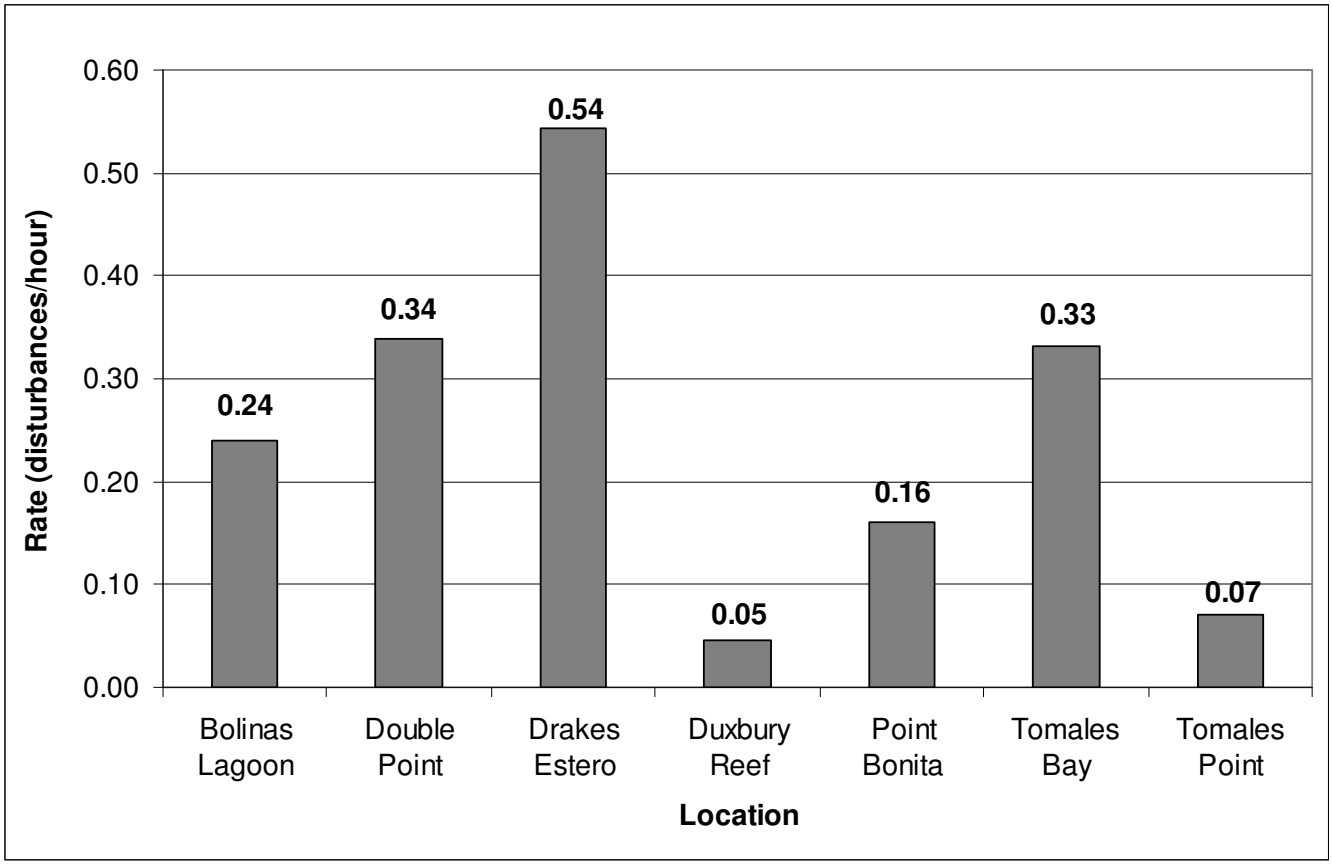
Maximum pup counts in 2012



Maximum molt counts in 2012



Rates of disturbances per hour from March to July in 2012



Types of disturbances recorded between March and July in 2012